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Japanese Kokai Patent Application
No. Hei 6[1994]-254410

CATALYST CARRIER FOR EXHAUST GAS PURIFICATION DEVICE

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CATALYST CARRIER FOR EXHAUST GAS PURIFICATION DEVICE

[Haiki gasu joka sochi yo no shokubai tantai]

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Applicant:	Showa Aircraft Ind. Co., Ltd.

[There are no amendments to this patent.]

Claims

1. Catalyst carrier for exhaust gas purification device characterized in that it has a carrier core that forms a roll shape as well as a honeycomb structure, an outer cylinder that houses said carrier core, and an inner cylinder that is provided between said carrier core and said outer cylinder, and in that many holes are formed in said inner cylinder.

2. Catalyst carrier for exhaust gas purification device characterized in that it has a carrier core that forms a roll shape as well as a honeycomb structure, an outer cylinder that houses said carrier core, and an inner cylinder that is provided between said carrier core and said outer cylinder, and in that many beads are formed on said inner cylinder.

3. Catalyst carrier for exhaust gas purification device characterized in that it has a carrier core that forms a roll shape as well as a honeycomb structure, an outer cylinder that houses said carrier core, and an inner cylinder that is provided between said carrier core and said outer cylinder, and in that an inner flange is formed on the exhaust gas outlet end of the inner cylinder and said inner flange fastens said carrier core.

4. Catalyst carrier for exhaust gas purification device characterized in that it has a carrier core that forms a roll shape as well as a honeycomb structure, an outer cylinder that houses said carrier core, and an inner cylinder that is provided between said carrier core and said outer cylinder, and in that said inner cylinder and outer cylinder are formed integrally and at the same time are bent inward and outward.

Detailed explanation of the invention

[0001]

Industrial application fields

This invention pertains to a catalyst carrier for exhaust gas purification devices. That is, it pertains to a catalyst carrier that is used for the catalytic converter that purifies exhaust gas for automobile engines, for example, and on which a catalyst substance is adsorbed as a base carrying material.

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*[Numbers in margin indicate pagination in the foreign text.[

[0002]

Prior art

Figure 6 is a perspective diagram of a conventional example; (1) shows its corrugated sheet, (2) its flat sheet, and (3) the entire unit. As shown in this figure, conventional catalyst carrier (1) for exhaust gas purification devices is composed of carrier core (2) that forms a roll shape as well as a honeycomb structure, and outer cylinder (3) that is a case that houses and carrier core (2) inside it. Carrier core (2) and outer cylinder (3) of this type are in direct contact with each other and also are integrally joined by brazing. Note that, as carrier core (2), an item where corrugated sheet (4) shown in Figure 6 (1) and flat sheet (5) shown in Figure 6 (2) are positioned alternately and are rolled into a multi-layer roll form would be representative. So, during operation of an automobile, for example, high-temperature gas containing harmful substances from the engine would pass through carrier core (2) of catalyst carrier (1) and react with the catalyst substance, thereby becoming purified.

[0003]

Problems to be solved by the invention

In this connection, with a conventional example such as this, the following problems can be pointed out. In short, in a usage environment through which not only high-temperature exhaust gas passes but that where heating caused by the catalyst reaction is seen, there is a significant temperature difference and a difference in expansion and contraction between carrier core (2) on the inside catalyst carrier (1) and outer cylinder (3) on the outside, that is cooled by air and by which heat is radiated away, and carrier core (2) and outer cylinder (3) of this type would conventionally touch directly, as described above, and at the same time, would be joined by brazing, and would mutually restrict each other. So, with conventional catalyst carrier (1), due to the difference in diametrical and axial expansion and contraction (difference in amount of expansion and contraction) between carrier core (2) and outer cylinder (3), thermal stress would act. When used over a long period of time, thermal stress fatigue would occur due to the repeated expansion and contraction caused by thermal stress, and it would be easy for deterioration, damage, cracking, breakage, etc. to occur near the portions where the two are brazed, etc.

[0004]

This type of thermal stress fatigue is particularly noticeable near the second and third layers around the outside of carrier core (2), and carrier core (2) could even fall away from the inside of outer cylinder (3) due to cracking or breakage there. So for conventional catalyst carrier (1) for exhaust gas purification devices, thermal stress fatigue based on the usage environment could be pointed out and has been a problem for durability.

[0005]

Note that, to solve this type of problem, there has been developed a catalyst carrier for exhaust gas purification devices, as shown in Japanese Kokai Patent Application No. Hei 1[1989]-157139, where a middle cylinder provided with a flexible part at one end is provided between carrier core (2) and outer cylinder (3), and one end and the other end of this type of middle cylinder are each joined to carrier core (2) or to outer cylinder (3). However, with this catalyst carrier shown in Japanese Kokai Patent Application No. Hei 1[1989]-157139, various problems can be pointed out. Assembly during manufacture is troublesome and the work requires time, e.g., joining the middle cylinder to carrier core (2) or outer cylinder (3) as specified is not easy, and particularly the work of joining them with a flexible part between is extremely difficult, and there are also problems from the standpoint of manufacturing cost. Additionally, problems from the standpoint of quality could also be pointed out, e.g., quality is not reliable due to the difficulty of this type of joining structure.

[0006]

This invention was devised in consideration of this situation to solve the problems with the aforementioned conventional example. Its purpose is to provide a catalyst carrier for exhaust gas purification devices that not only has a carrier core, an outer cylinder, and an inner cylinder, but that is superior from the standpoints of workability, cost, and quality. In Claims 1 and 2, by forming holes or beads for the inner cylinder, first, thermal stress will be alleviated, and secondly, this is realized simply and easily. In Claim 3, by forming an inner flange for the inner cylinder, first, thermal stress is alleviated, and in particular, the carrier core's falling away is prevented, and secondly, this is simply and easily realized. In Claim 4, by forming the inner cylinder and outer cylinder bent integrally, first, thermal stress is alleviated, and secondly, this is simply and easily realized.

[0007]

Means to solve the problems

The technological means of this invention that will achieve this purpose is as follows. In short, this catalyst carrier for exhaust gas purification devices has a carrier core that forms a roll shape and as well as a honeycomb shape, an outer cylinder that houses said carrier core, and an inner cylinder that is provided between said carrier core and the outer cylinder. Also, in Claim 1, many holes are formed in said inner cylinder. In Claim 2, many beads are formed on said inner cylinder. In Claim 3, an inner flange is formed on the exhaust gas outlet end of said inner cylinder and said inner flange fastens said carrier core. In Claim 4, said inner cylinder and outer cylinder are formed integrally and at the same time are bent inward and outward. /3

[0008]

Function

This invention, since it is composed of a means such as this, operates as follows. This catalyst carrier is used under conditions through which not only high-temperature exhaust gas passes, but where heat generated as a result of catalyst reactions is seen. The temperature difference between the carrier core on the inside and the outer sleeve on the outside, that is cooled by the air and by which heat is radiated away, is significant, and a difference in expansion and contraction occurs. So, in Claims 1 and 2, an inner cylinder is provided between the carrier core and the outer cylinder, and at the same time, many holes or beads are formed in the inner cylinder. So, first, not only do the carrier core and outer cylinder not directly touch, but space is formed between the two by the many holes or beads in the inner cylinder that is provided between them. So temperature differences, differences in expansion and contraction, and thermal stress between the two are reliably alleviated. Thus, even when used for a long period of time, expansion and contraction due to thermal stress, and then thermal stress fatigue are avoided, deterioration, damage, cracking, breakage, etc. between the carrier core and the outer cylinder, particularly near the second and third layers around the outside of the carrier core are prevented, and the carrier core can even be prevented from falling away. Secondly, these are further realized easily with a simple constitution.

[0009]

Next, in Claim 3, not only is an inner cylinder provided between the carrier core and the outer sleeve, but an inner flange is formed at the end of the inner cylinder. So, first, since an inner cylinder is provided, corresponding to the point discussed in Claims 1 and 2, temperature differences, differences in expansion and contraction, and thermal stress, etc. are alleviated, and thermal stress fatigue is avoided, so deterioration, damage, cracking, breakage, etc. are prevented. In particular, since it is fastened by the inner flange, the carrier core is prevented from falling away. Secondly, these are further realized easily with a simple constitution.

[0010]

Additionally, in Claim 4, not only is an inner cylinder provided between the carrier core and the outer cylinder, but the inner cylinder and the outer cylinder are formed integrally and are bent inward and outward. So, first, since an inner cylinder is provided, corresponding to the point discussed in Claims 1 and 2, temperature differences, differences in expansion and contraction, and thermal stress, etc. are alleviated, and thermal stress fatigue is avoided, so deterioration, damage, cracking, breakage, etc. are prevented. Secondly, since the inner cylinder and the outer cylinder are formed integrally, these are realized easily with a simple constitution and quality is also stabilized.

[0011]

Application examples

Below, this invention is explained in detail based on the application examples shown in the figures. Figure 1, Figure 2, and Figure 3 (1) show a first application example of this invention. Figure 1 (1) is an expanded explanatory plane diagram, (2) is an explanatory front view where it is bent, and (3) is an explanatory side view of the same. In addition, Figure 2 (1) is an explanatory plane cross section worked into a cylinder, (2) is an explanatory front view of its major parts, and (3) is an explanatory plane cross section with the carrier core inside. Figure 3 (1) is an explanatory front view of the carrier core inside. First, a first application example of this invention is explained with these Figures 1, 2, and 3 (1).

[0012]

This catalyst carrier (6) for exhaust gas purification devices has carrier core (2), that forms a roll shape as well as a honeycomb structure, outer cylinder (7) that houses carrier core (2), and inner cylinder (8) provided between carrier core (2) and outer cylinder (7). These are first discussed in detail.

[0013]

First, carrier core (2) of catalyst carrier (6) is discussed. As carrier core (2) in Figure 2 (3), an item where corrugated sheet (4) and flat sheet (5) are rolled into a roll shape, as shown in Figure 6 above, for example, is used. Corrugated sheet (4) is made from material made by continuous bending to form, for example, triangular wave shaped indentations and projections at a specific pitch and height by corrugating or pressing metal foil, e.g., band-shaped stainless steel foil (refer to Figure 6 (1)). And as flat sheet (5), band-shaped stainless steel foil, etc., the same thickness and material as corrugated sheet (4), is used unworked (refer to Figure 6 (2)). So there is formed carrier core (2), whose overall cross section shape forms a round roll shape, by stacking one sheet each of corrugated sheet (4) and flat sheet (5) so that they are positioned alternately from a fixed center point and at the same time rolling them up, and by joining all or part of the portions of the two that touch by brazing or welding (refer to Figure 6 (3)). Note that carrier core (2) is not limited to this, but various other types are possible. Carrier cores (2) in various patterns could be considered; for example, where one corrugated sheet (4) and two flat sheets (5) are rolled up, where corrugated sheet (4) only is rolled up, where multiple corrugated sheets (4) and flat sheets (5) are simultaneously stacked and rolled up, or where the overall cross section shape is elliptical, in the shape of a running track.

[0014]

This carrier core (2) also forms a honeycomb shape (refer to Figure 6 (3)). That is, corrugated sheet (4) and flat sheet (5) form cells walls. While triangles, squares, trapezoids, hexagons, as well as other shapes, are formed, they are composed of flat aggregates of many hollow columnar cells (9) that are separated into individual unit spaces. Carrier core (2) forms a honeycomb structure in this way, so like a general honeycomb core, it has excellent strength to weight, and while it is lightweight, it is highly rigid and strong. In addition, it also has excellent flow-regulating effects, plane precision, heat retention, and noise blocking ability, it is easily

molded, and it is also superior from the standpoint of cost, all of which are known characteristics. Additionally, it has large surface area per unit volume, that is, the surface area of corrugated sheet (4) and flat sheet (5) that make up the cell walls is large. So, for example, it is used for a catalytic converter that purifies exhaust gas from an automobile engine and catalyst substances are coated onto or adsorbed onto the surfaces of corrugated sheet (4) and flat sheet (5) that make up the cell walls as the base catalyst material. That is, catalyst substances, such as precious metals for redox by which harmful substances in the exhaust gas are removed by reaction, are coated or adsorbed onto the surface with a carrier layer, such as alumina, between.

[0015]

Next, inner cylinder (8) and outer cylinder (7) of catalyst carrier (6) are discussed. For this first application example, as shown first in Figure 2 (3), not only are inner cylinder (8) and outer cylinder (7) formed integrally, but they are bent inward and outward. At the same time, as shown in Figure 2 (1), inner cylinder (8) is subjected to hole working and many holes (10) are formed. Additionally, as shown in each part of Figure 2, inner flange (12) is formed at the exhaust gas outlet end (11) of inner cylinder (8). Inner flange (12) fastens carrier core (2), and at the same time, as shown in Figure 2 (3), exhaust gas outlet end (11) of inner cylinder (8) and carrier core (2) are joined by brazing. /4

[0016]

The shaping process for inner cylinder (8) and outer cylinder (7) of this type is discussed in detail. First, as shown in the expanded diagram in Figure 1 (1), inner cylinder formation part (14) and outer cylinder formation part (15) are formed integrally for one flat metal sheet (13), made of stainless steel, etc. Then, inner cylinder formation part (14) undergoes hole working, and many long slits (10) are formed side by side along the axis when inner cylinder (8) is subsequently made in the example shown. These holes (10) are formed where complete slits and notch-shaped slits, whose end toward the axis is open, alternate. Along with this, inner flange formation part (16) is formed integrally at the end of inner cylinder formation part (14) toward the axis. Inner flange formation part (16) in the example shown forms many small pieces with slot-shaped holes (10) with openings, discussed above, and small notches (17) between them.

[0017]

Next, as shown in Figure 1 (2) and (3), for this metal sheet (13), inner cylinder formation part (14) and outer cylinder formation part (15) are bent inward and outward, in the example shown, with the backs meeting with slight gap (A), and at the same time, each inner flange formation part (16) of inner cylinder formation part (14) is bent at a right angle at the opposite end from outer cylinder formation part (15). After this, as shown in Figure 2 (1) and (2), this metal sheet (13) undergoes cylindrical working with inner cylinder formation part (14) as the inside, so that cylindrical inner cylinder (8) is formed by inner cylinder formation part (14), cylindrical outer cylinder (7) by outer cylinder formation part (15), and inner flange (12) by inner flange formation part (16), respectively. Note that inner flange (12) is formed by inner flange formation part (16) in the example shown, so it is composed of an aggregate of many small pieces.

[0018]

After this, as shown in Figure 2 (3), carrier core (2) prepared as discussed above is inserted. That is, using inner cylinder (8) and outer cylinder (7) described above as a case, inside them, in the example shown, carrier core (2) is housed coaxially with a slight gap (A). After this, exhaust gas outlet end (11) of inner cylinder (8) and the same exhaust gas outlet end (11) of carrier core (2) are joined by brazed part (18) that uses a brazing material, for example, a paste, powder, or filler. Along with this, the same end of carrier core (2) is fastened by inner flange (12) formed at the end of inner cylinder (8) so that it will not slip out of exhaust gas outlet end (11). In addition, as shown in Figure 3 (1), both ends of inner cylinder (7), that is worked into a cylinder as discussed above, are joined by welded parts (19) by projection welding, and outer cylinder (7) is formed as a complete cylindrical body. For inner cylinder (8) this type of joining is selectively applied when needed.

[0019]

Catalyst carrier (6) is manufactured in this way. For catalyst carrier (6) in this first application example, inner cylinder (8) and outer cylinder (7) are formed bent integrally with slight gap (A) in the example shown, many slit-shaped long holes (10) and inner flange (12) are formed for inner cylinder (8), and inner cylinder (8) and carrier core (2) are joined at the ends. Also, carrier core (2) is housed in outer cylinder (7) of this type with slight gap (A) and with

inner cylinder (8) between them in the example shown. Note that this invention is not limited to such as this first application example, and the following items, for example, could also be considered.

[0020]

First, in catalyst carrier (6) in the first application example described above, carrier core (2) formed a circular cross section, and inner cylinder (8) and outer cylinder (7) also formed cylinders, but, for example, when carrier core (2) forms an elliptical cross section like a running field, as discussed above, inner cylinder (8) and outer cylinder (7) also form elliptical tubes that match it.

[0021]

Secondly, Figure 3 (2) is an explanatory cross section of a second application example of this invention. In short, with the first application example discussed above, inner cylinder (8) and outer cylinder (7) were formed bent integrally, but rather than this, inner cylinder (8) and outer cylinder (7) could be formed separately, and carrier core (2) inserted and joined with inner cylinder (8) by brazed part (18), and then inner cylinder (8) and outer cylinder (7) of this type could be joined by welded part (20) between the ends with the exhaust gas outlet. In addition, one could also consider joining inner cylinder (8) and outer cylinder (7) by welded part (20), then inserting carrier core (2) into inner cylinder (8) and joining them with brazed part (18). Catalyst carrier (6) in this second application example has the advantage of being even better, from the standpoint of overall strength, with such a constitution.

[0022]

Thirdly , Figure 4 shows a third application example and a fourth application example of this invention. (1) is an explanatory plane diagram with the third application example expanded, (2) is an explanatory side view of the same third application example, (3) is an explanatory plane view with the fourth application example expanded, and (4) is an explanatory side view of the same fourth application example. In short, in the first application example described above, holes (10) formed in inner cylinder (8) formed long slits along the axis, but rather than this, as shown in Figure 4 (1) and (2), for example, many round holes (10) could also be formed by punching, etc. Further, as shown in Figure 4 (3) and (4), short slot-shaped holes (10) could be formed

axially and diametrically, that is, holes (10) that are alternately longitudinal and lateral. In addition, various shapes could be considered for the shape of holes (10) formed in inner cylinder (8).

[0023]

Fourthly, Figure 5 shows a fifth application example of this invention. (1) is an expanded explanatory plane view, (2) is an explanatory side view of the same, (3) is an explanatory plane view where it is bent, and (4) is an explanatory side view of the same. In short, with the first application example described above, inner cylinder (8) underwent hole working and many holes (10) were formed, but inner cylinder (8) could also undergo bead working to form multiple beads (21). That is, along with many holes (10), described above, shown in Figure 5, or in place of many holes (10), beads (21) in the form of small, continuous projections could also be formed. Two beads (21) running axially and diametrically at a right angle are formed in the example shown in Figure 5. Note that, in each of these second, third, fourth, and fifth application examples, the other contents and functions, etc. of the other component members are analogous to those in the first application example described above, therefore they have the same symbols and explanations. /5

[0024]

This invention is constituted as explained above, so it will be as follows. This catalyst carrier (6) for exhaust gas purification devices is composed of honeycomb structure carrier core (2), outer cylinder (7) for housing it, and inner cylinder (8) that is provided between the two. So exhaust gas, that contains harmful substances, passes through the inside of carrier core (2) from the exhaust gas outlet to exhaust gas outlet end (11) and the harmful substances react with the adsorbed catalyst to be removed and purified. Catalyst carrier (6) of this type is used in an environment through which high-temperature exhaust gas passes, and also where heat generation caused by the catalyst reaction is seen, and the temperature difference between carrier core (2) on the inside of catalyst carrier (6) and outer cylinder (7) on the outside, that is cooled by air and by which heat is radiated away, is significant.

[0025]

So then, with catalyst carrier (6) in each of the first, second, third, fourth, and fifth application examples, in each case, there is a two-layer structure where inner cylinder (8) is provided between carrier core (2) and outer cylinder (7), and at the same time, many holes (10) or multiple beads (21) are formed in inner cylinder (8). So, between carrier core (2) and outer cylinder (7), the temperature difference is significant and a difference in expansion and contraction occurs as discussed above, but first, due to the fact that inner cylinder (8) is provided between them, the two do not touch directly and are not integrally joined. At the same time, due to the many holes (10) or multiple beads (21) of inner cylinder (8), space is formed between the two. Additionally, in the examples shown, gap (A) is present between inner cylinder (8) and outer cylinder (7) and between carrier core (2) and inner cylinder (8), so because of this, the temperature difference, the difference in expansion and contraction, and thermal stress between carrier core (2) and outer cylinder (7) will be reliably alleviated.

[0026]

In short, due to the presence of inner cylinder (8) provided in the middle, the presence of air produced by holes (10) or beads (21), that is an air layer, the presence of each gap (A), that serve as air layers, and additionally, the shape of holes (10) and beads (21), first, direct thermal conduction between carrier core (2) and outer cylinder (7) is blocked and the temperature difference is alleviated, and the diametrical and axial differences in expansion and contraction of the material (difference in amount of expansion and contraction) in the two is absorbed accordingly and thermal stress between the two is alleviated. Thus, with this catalyst carrier (6), expansion and contraction dues to thermal stress is alleviated, even with use over a long period of time, and thermal stress fatigue is avoided. So deterioration, damage, cracking, and breakage between carrier core (2) and outer cylinder (7), particularly near the second and third layers around the outside of carrier core (2) and near brazed part (18) and welded part (20), are prevented, and thus carrier core (2) will be prevented from falling away. Further, these are realized easily with a simple constitution just by providing inner cylinder (8) in the middle with holes (10) and beads (21).

[0027]

In addition to this, with catalyst carrier (6) in each application example, inner flange (12) is formed at exhaust gas outlet end (11) of inner cylinder (18), and carrier core (2) is fastened, so carrier core (2) is reliably prevented from falling away from inner cylinder (8) and outer cylinder

(7). Further, this is realized easily with a simple constitution just by providing inner cylinder (8) with attached inner flanges (12).

[0028]

Additionally, in each of these application examples, inner cylinder (8) and carrier core (2) are joined by brazed part (18) only at the exhaust gas outlet ends (11). So the exhaust gas inlet sides of both are free ends and they can expand and contract freely axially with nothing restricting them. From this standpoint, too, the difference in expansion and contraction and thermal stress described above is alleviated, thermal stress fatigue is avoided, and deterioration, damage, cracking, breakage, and separation are prevented.

[0029]

Additionally, in catalyst carrier (6) in each of the first, third, fourth, and fifth application examples, inner cylinder (8) and outer cylinder (7) are formed integrally and bent inward and outward. This catalyst carrier (6) will be a particularly simple, easy constitution. That is, since inner cylinder (8) and outer cylinder (7) are formed bent integrally, the tedious work of joining the two during manufacture is unnecessary, so not only is the work easy, but bending of the two is simple and quality is stabilized.

[0030]

Effect of the invention

First, the catalyst carrier for exhaust gas purification devices associated with Claims 1 and 2 of this invention has, as explained above, a carrier core, an outer cylinder, and an inner cylinder, and at the same time, by making many holes or beads in the inner cylinder, the following effects are exhibited. First, thermal stress is alleviated. So, even when used for long periods of time, thermal stress fatigue is avoided, and deterioration, damage, cracking, and breakage between the carrier core and the outer cylinder are prevented. In particular, cracking or breakage near the second and third layers around the outside of the carrier core, where thermal stress fatigue would have been noticeable conventionally, is prevented, the carrier core is prevented from falling away, and the catalyst carrier's durability is improved. Secondly, this is

further realized easily with a simple constitution, and is excellent from the standpoints of workability, cost, and quality.

[0031]

Next, the catalyst carrier for exhaust gas purification devices associated with claim 3 has, as explained above, a carrier core, an outer cylinder, and an inner cylinder, and at the same time, by forming an inner flange on the inner cylinder, the following effects are exhibited. First, separation near the second and third layers around the outside of the carrier core is reliably prevented, and in addition, thermal stress is alleviated and thermal stress fatigue is avoided, so deterioration, damage, cracking, and breakage between the carrier core and the outer cylinder are prevented and the catalyst carrier's durability is improved. Secondly, this is further realized easily with a simple constitution, and is excellent from the standpoints of workability, cost, and quality.

[0032]

Additionally, the catalyst carrier for exhaust gas purification devices associated with Claim 4 has, as explained above, a carrier core, an outer cylinder, and an inner cylinder, and at the same time, by forming the inner cylinder and outer cylinder bent integrally, the following effects are exhibited. First, thermal stress is alleviated and thermal stress fatigue is avoided, so deterioration, damage, cracking, and breakage between the carrier core and the outer cylinder are prevented and the catalyst carrier's durability is improved. Secondly, this is further realized easily with a simple constitution. That is, the tedious work of joining the inner cylinder and outer cylinder during manufacturing is unnecessary, the work is easy, and it does not take [too much] time. In addition, bending of the tow is simple, working expenses are reduced, and manufacturing costs are reduced, making the price lower, and quality is stabilized. In this way, the effects exhibited by this invention, by which the problems that existed with this type of conventional example are cleared up, are remarkable and thus significant. /6

Brief description of the figures

Figure 1 shows a first application example of a catalyst carrier for exhaust gas purification devices associated with this invention; (1) is an expanded explanatory plane view, (2) an explanatory plane view where it is bent, and (3) an explanatory side view of the same.

Figure 2 shows the same first application example; (1) is an explanatory plane view where it has been worked into a cylinder, (2) is an explanatory front view of its major parts, and (3) is an explanatory plane cross section with the carrier core inside.

Figure 3 (1) is an explanatory plane view for the same first application example with the carrier core inside and (2) is an explanatory plane cross section of a second application example of this invention.

Figure 4 shows a third application example and a fourth application example of this invention; (1) is an explanatory plane view with the third application example expanded, (2) is an explanatory side view of the same third application example, (3) is plane view with the fourth application example expanded, and (4) is an explanatory side view of the same fourth application example.

Figure 5 shows a fifth application example of this invention; (1) is an expanded explanatory plane view, (2) is an explanatory side view of the same, (3) is an explanatory plane view where it is bent, and (4) is an explanatory side view of the same.

Figure 6 is a perspective diagram provided to explain a conventional example of a catalyst carrier for exhaust gas purification devices; (1) shows the corrugated sheet, (2) the flat sheet, and (3) the entire unit.

Explanation of symbols

(1) Catalyst carrier (in conventional example)
(2) Carrier core
(3) Outer cylinder (in conventional example)
(4) Corrugated sheet
(5) Flat sheet
(6) Catalyst carrier (this invention)
(7) Outer cylinder (this invention)
(8) Inner cylinder
(9) Cell
(10) Hole
(11) Exhaust gas outlet end
(12) Inner flange
(13) Metal sheet
(14) Inner cylinder formation part
(15) Outer cylinder formation part

(16) Inner flange formation part
(17) Small notch
(18) Brazed part
(19) Welded part
(20) Welded part
(21) Bead
(A) Gap

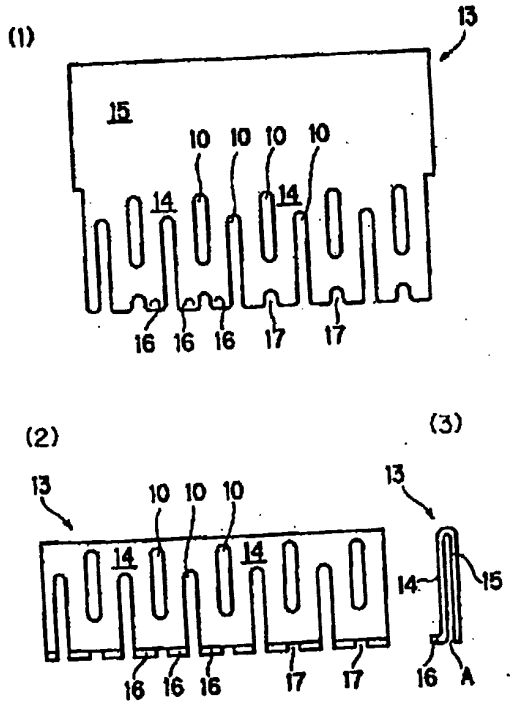


Figure 1

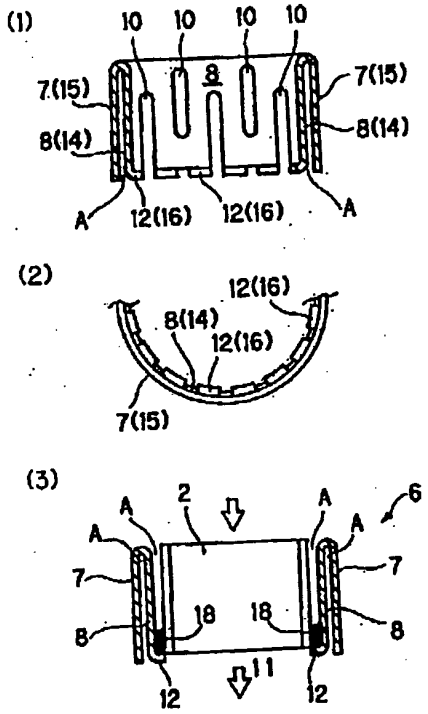


Figure 2

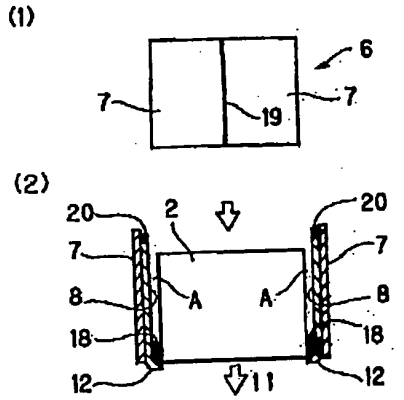


Figure 3

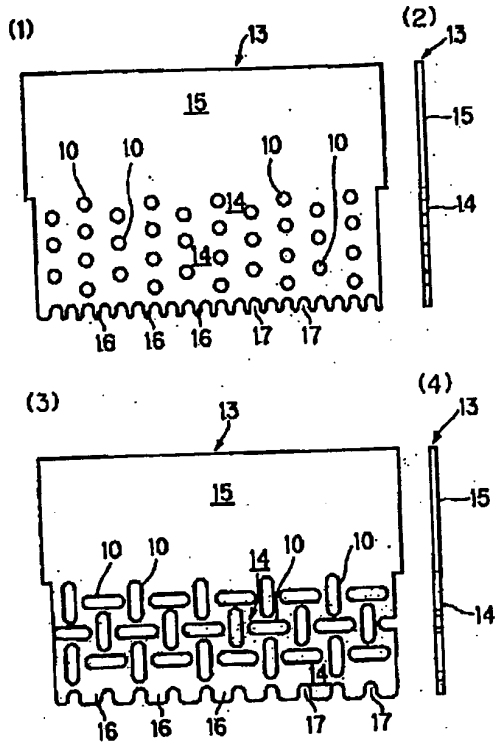


Figure 4

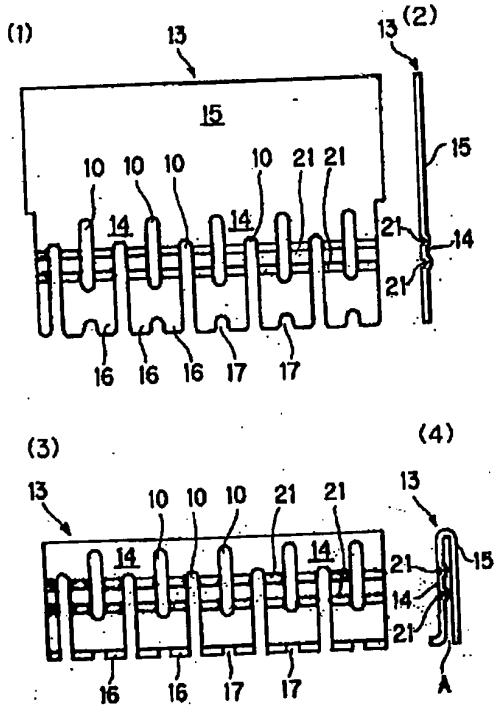


Figure 5

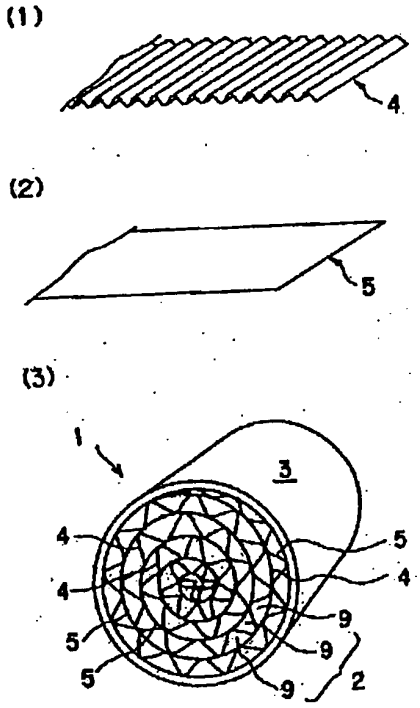


Figure 6

Patent Abstracts of Japan

PUBLICATION NUMBER : 06254410
PUBLICATION DATE : 13-09-94

APPLICATION DATE : 02-03-93
APPLICATION NUMBER : 05066030

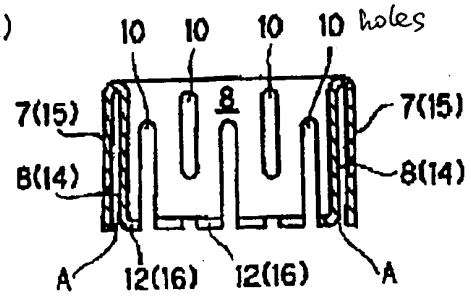
APPLICANT : SHOWA AIRCRAFT IND CO LTD;

INVENTOR : MUTO TSUTOMU;

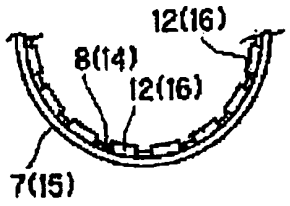
INT.CL. : B01J 35/04 B01J 35/04 F01N 3/28
F01N 3/28

TITLE : CATALYST CARRIER FOR EXHAUST EMISSION CONTROL DEVICE

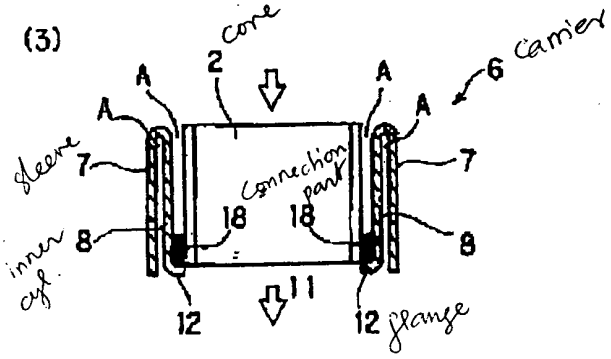
(1)



(2)



(3)



ABSTRACT : PURPOSE: To provide a catalyst carrier for an exhaust emission control device which enables moderation of thermal stress and avoidance of metal fatigue due to thermal stress out a long period of use as well as improvement of durability on account of the prevention of occurrence of qualitative deterioration, damage, fissure or rupture near the second or third layer of the outer peripheral side of the carrier core, and further, allows easy realization of the features using a simple constitution, contributing to the amelioration of ease of operation, and quality as well as saving cost.

CONSTITUTION: The catalyst carrier 6 consists of a carrier core 2 of honeycomb structure, a sleeve 7 for storage and an inner cylinder 8 which is allowed to be present between the former two. In addition, numerous holes 10 and beads are formed on the inner cylinder 7, and an inner flange 12 is formed on the end of the exhaust gas discharge aperture side of the inner cylinder 8. Further, both inner cylinder 8 and sleeve 7 are formed in one piece and folded internally and externally, and the inner cylinder 8 and the carrier core 2 are connected by a brazed connection part 18 on the end of the exhaust gas discharge aperture side 11. Consequently, the temperature and expansion/contraction differences and thermal stress between the carrier core 2 and the sleeve 7 are moderated.

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号

特開平6－254410

(43)公開日　平成６年(1994)９月13日

(51)Int.Cl.[5]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｂ０１Ｊ　35/04	３２１　Ａ	8017－4G		
	ＺＡＢ	8017－4G		
Ｆ０１Ｎ　3/28	ＺＡＢ			
	３１１　Ｓ			

審査請求　未請求　請求項の数４　ＦＤ　（全　７　頁）

(21)出願番号　特願平5－66030

(22)出願日　平成５年(1993)３月２日

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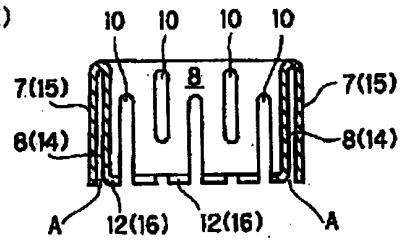
(54)【発明の名称】　排気ガス浄化装置用の触媒担体

(57)【要約】

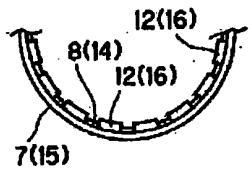
【目的】　第１に、熱応力が緩和され、長期間使用しても熱応力疲労が回避され、もって担体コアと外筒間、特に担体コアの外周側２，３層目付近の劣化，損傷，亀裂，破断等が防止され、担体コアの脱落も防止される等、耐久性が向上し、第２に、しかもこれらが簡単な構成により容易に実現され、作業性，コスト面，品質面等にも優れた、排気ガス浄化装置用の触媒担体を提案する。

【構成】　この触媒担体６は、ハニカム構造の担体コア２と、収納用の外筒７と、両者間に介装された内筒８とからなる。そして内筒７には多数の穴１０やビードが形成され、又、内筒８の排気ガス出口側１１の端には内フランジ１２が形成され、更に、内筒８と外筒７が一体形成され内外に折曲されてなり、しかも、内筒８と担体コア２は排気ガス出口側１１の端部でろう接部１８にて接合されてなる。そこで、担体コア２と外筒７間の温度差，伸縮差，熱応力等は緩和される。

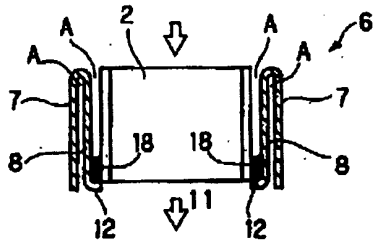
(1)



(2)



(3)



【特許請求の範囲】

【請求項１】　ロール状をなすと共にハニカム構造をなす担体コアと、該担体コアを収納する外筒と、該担体コアと外筒間に介装された内筒と、を有してなり、該内筒に多数の穴加工が施されていること、を特徴とする排気ガス浄化装置用の触媒担体。

【請求項２】　ロール状をなすと共にハニカム構造をなす担体コアと、該担体コアを収納する外筒と、該担体コアと外筒間に介装された内筒と、を有してなり、該内筒に複数のビード加工が施されていること、を特徴とする排気ガス浄化装置用の触媒担体。

【請求項３】　ロール状をなすと共にハニカム構造をなす担体コアと、該担体コアを収納する外筒と、該担体コアと外筒間に介装された内筒と、を有してなり、該内筒の排気ガス出口側の端に内フランジが形成され、該内フランジが該担体コアを係止していること、を特徴とする排気ガス浄化装置用の触媒担体。

【請求項４】　ロール状をなすと共にハニカム構造をなす担体コアと、該担体コアを収納する外筒と、該担体コアと外筒間に介装された内筒と、を有してなり、該内筒と外筒が一体形成されると共に内外に折曲されてなること、を特徴とする排気ガス浄化装置用の触媒担体。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、排気ガス浄化装置用の触媒担体に関する。すなわち、例えば自動車エンジン等の排気ガスを清浄化する触媒コンバータに用いられ、担持母体として触媒物質が付着される、触媒担体に関するものである。

【０００２】

【従来の技術】図６はこの種従来例の斜視図であり、（１）図はその波板を、（２）図はその平板を、（３）図はその全体を示す。同図にも示すように、従来の排気ガス浄化装置用の触媒担体１は、ロール状をなすと共にハニカム構造をなす担体コア２と、担体コア２を内部に収納保持するケースたる外筒３とからなり、このような担体コア２と外筒３とが、直接密接されると共に一体的にろう付け接合されていた。なお担体コア２としては、図６の（１）図に示した波板４と図６の（２）図に示した平板５とを、交互に位置するように、多層にロール状に巻き付けてなるものが代表的であった。そして、例えば自動車運転時において、エンジンからの有害物質を含む高温の排気ガスが触媒担体１の担体コア２中を通過し、その触媒物質と反応して清浄化されていた。

【０００３】

【発明が解決しようとする課題】ところで、このような従来例にあっては、次の問題が指摘されていた。すなわち、高温の排気ガスが通過すると共に触媒反応による発熱もみられる使用環境下において、触媒担体１の内部側の担体コア２と、外気にて冷却，放熱される外部側の外筒３とは、温度差が大きく伸縮差が生じるが、このような担体コア２と外筒３とは従来、前述により直接密接されると共に一体的にろう付け接合され、相互間が規制されていた。そこで従来の触媒担体１では、担体コア２と外筒３間における径方向および軸方向の伸縮差（膨張，収縮量の差）に起因して、熱応力が作用し、長期間使用すると熱応力による伸縮の繰り返しにより、熱応力疲労が生じ、両者のろう付け接合部付近等から劣化，損傷，亀裂，破断等が発生しやすかった。

【０００４】特に、担体コア２の外周側の２，３層目付近において、このような熱応力疲労が顕著であり、その亀裂，破断等により、担体コア２が外筒３内から脱落してしまうこともあった。このように、従来の排気ガス浄化装置用の触媒担体１は、その使用環境に基づく熱応力疲労が指摘され、耐久性に問題があった。

【０００５】なお、このような問題を解決すべく、特開平１－１５７１３９号公報に示されたように、担体コア２と外筒３間に、一端部に撓み部を備えた中間筒を介装し、このような中間筒の一端部と他端部を、担体コア２又は外筒３にそれぞれ接合してなる、排気ガス浄化装置用の触媒担体も従来開発されていた。しかしながら、この特開平１－１５７１３９号公報に示された触媒担体は、中間筒を担体コア２や外筒３に所定のごとく接合することが容易でなく、特に撓み部を介しての接合作業が極めて困難である等、製造時の取付作業が面倒で作業に時間を要するという問題が指摘され、製造コスト面に難点があった。更に、このような接合構造の複雑さに起因し品質が安定しない等、品質面にも問題が指摘されていた。

【０００６】本発明は、このような実情に鑑み、上記従来例の問題点を解決すべくなされたものであって、担体コアと外筒と内筒とを有すると共に、請求項１，２では内筒に多数の穴加工やビード加工を施したことにより、第１に、熱応力が緩和されると共に、第２に、これは簡単容易に実現され、請求項３では内筒に内フランジを形成したことにより、第１に、熱応力が緩和され特に担体コアの脱落が防止されると共に、第２に、これは簡単容易に実現され、請求項４では内筒と外筒が一体折曲形成されたことにより、第１に、熱応力が緩和されると共に、第２に、これは簡単容易に実現され特に作業性，コスト面，品質面等に優れてなる、排気ガス浄化装置用の触媒担体を提案することを目的とする。

【０００７】

【課題を解決するための手段】この目的を達成する本発明の技術的手段は、次のとおりである。すなわち、この排気ガス浄化装置用の触媒担体は、ロール状をなすと共にハニカム構造をなす担体コアと、該担体コアを収納する外筒と、該担体コアと外筒間に介装された内筒と、を有してなる。そして請求項１では、該内筒に多数の穴加工が施されている。請求項２では、該内筒に複数のビー

ド加工が施されている。請求項3では、該内筒の排気ガス出口側の端に内フランジが形成され、該内フランジが該担体コアを係止している。請求項4では、該内筒と外筒が一体形成されると共に内外に折曲されてなる。

【0008】

【作用】本発明は、このような手段よりなるので、次のように作用する。この触媒担体は、高温の排気ガスが通過すると共に触媒反応による発熱もみられる使用環境下で用いられ、内部側の担体コアと、外気にて冷却，放熱される外部側の外筒とは、温度差が大きく伸縮差が生じる。そこで請求項1，2では、担体コアと外筒間に内筒が介装されると共に、内筒に多数の穴やビードが形成されている。そこで第1に、担体コアと外筒とは、直接接しないと共に、介装された内筒の多数の穴やビードにより両者間に空間が形成されているので、両者間の温度差，伸縮差，熱応力等は確実に緩和される。従って長期間使用しても、熱応力による伸縮そして熱応力疲労が回避され、担体コアと外筒間、特に担体コアの外周側の2，3層目付近の劣化，損傷，亀裂，破断等は確実に防止され、担体コアの脱落も防止される。第2に、しかもこれらは、簡単な構成により容易に実現される。

【0009】次に請求項3では、担体コアと外筒間に内筒が介装されると共に、内筒の端に内フランジが形成されている。そこで第1に、内筒が介装されているので、請求項1，2について述べたところに準じ、温度差，伸縮差，熱応力等が緩和され、熱応力疲労等が回避されるので、劣化，損傷，亀裂，破断等は防止される。そして特に、内フランジにて係止されているので、担体コアの脱落は確実に防止される。第2に、しかもこれらは、簡単な構成により容易に実現される。

【0010】更に請求項4では、担体コアと外筒間に内筒が介装されると共に、内筒と外筒は、一体形成され内外に折曲されてなる。そこで第1に、内筒が介装されているので、請求項1，2等について述べたところに準じ、温度差，伸縮差，熱応力等が緩和され、熱応力疲労等が回避されるので、劣化，損傷，亀裂，破断，脱落等は防止される。第2に、しかも内筒と外筒が一体折曲形成されるので、これらは特に簡単な構成により容易に実現され、品質も安定する。

【0011】

【実施例】以下本発明を、図面に示すその実施例に基づいて、詳細に説明する。図1，図2，図3の（1）図等は本発明の第1実施例を示し、図1の（1）図は展開した状態の平面説明図、（2）図は折曲した状態の平面説明図、（3）図は同側面説明図である。又、図2の（1）図は円筒加工した状態の平断面説明図、（2）図は同要部の正面説明図、（3）図は、担体コアを入れた状態の平断面説明図である。図3の（1）図は、担体コアを入れた状態の平面説明図である。まず、これら図1，図2，図3の（1）図等により、本発明の第1実施例について説明する。

【0012】この排気ガス浄化装置用の触媒担体6は、ロール状をなすと共にハニカム構造をなす担体コア2と、担体コア2を収納する外筒7と、担体コア2と外筒7間に介装された内筒8と、を有してなる。最初にこれらについて詳述する。

【0013】まず、触媒担体6の担体コア2について述べる。図2の（3）図の担体コア2としては、例えば前述した図6中に示したように、波板4と平板5とを、ロール状に巻き付けてなるものが用いられる。波板4は、帯状のステンレス箔等の金属箔をコルゲート加工，プレス加工等することにより、所定ピッチと高さの例えば三角形の波形状の凹凸が、連続的に折曲形成されたものよりなる（図6の（1）図参照）。又、平板5としては、波板4と同肉厚かつ同材質の帯状のステンレス箔等が、そのまま用いられる（図6の（2）図参照）。そして、このような各1枚ずつの波板4と平板5を、一定中心点から交互に位置するように重ね合わせつつ多層に巻き取ると共に、両者の当接部分の全部又は一部をろう付けや溶接にて接合することにより、全体の断面形状が真円のロール状をなす担体コア2が成形される（図6の（3）図参照）。なお担体コア2は、このようなものに限定されず、その他各種のものが可能であり、例えば、1枚の波板4と2枚の平板5とを巻き付けたもの、波板4のみを巻き付けたもの、複数組の波板4と平板5とを同時に重ねて巻き付けたもの、全体の断面形状が略楕円のトラックフィールド状をなすもの、等々の各種パターンの担体コア2が考えられる。

【0014】そして、この担体コア2はハニカム構造をなす（図6の（3）図参照）。すなわち、波板4と平板5がセル壁を形成し、略三角形，略四角形，略台形，略半六角形，その他の各種形状をなしつつ、各々独立空間に区画された多数の中空柱状のセル9の平面的集合体よりなる。担体コア2は、このようにハニカム構造をなすので、一般的なハニカムコアと同様に、重量比強度に優れ軽量性と共に高い剛性・強度を備え、又、整流効果，平面精度，保温性，遮音性等にも優れ、成形が容易でコスト面にも優れる、等々の特性が知られている。そして更に、単位容積当りの表面積が大、つまりセル壁たる波板4と平板5の表面積が大である等により、例えば、自動車エンジン等の排気ガスを清浄化する触媒コンバータに用いられ、担持母体としてセル壁たる波板4と平板5の表面に触媒物質が、被覆・付着せしめられる。つまり、排気ガス中の各種有害物質を反応除去する、酸化還元用の貴金属等の触媒物質が、アルミナ等の担持層を介し表面に被覆・付着せしめられる。

【0015】次に、触媒担体6の内筒8および外筒7について述べる。この第1実施例にあっては、まず図2の（3）図に示したように、内筒8と外筒7とが一体形成されると共に内外に折曲されると共に、図2の（1）図

に示したように、内筒８には穴加工が施され多数の穴１０が形成されている。更に図２の各図に示したように、内筒８の排気ガス出口側１１の端に内フランジ１２が形成され、内フランジ１２が担体コア２を係止すると共に、図２の（３）図に示したように、内筒８の排気ガス出口側１１の端部と担体コア２間がろう付け接合されている。

【００１６】このような内筒８および外筒７について、その成形工程に沿って詳述する。まず、図１の（１）図の展開図に示したように、ステンレス鋼製等の１枚の平担な金属板１３について、内筒形成部１４と外筒形成部１５とが一体的に形成されている。そして、内筒形成部１４には穴加工が施され、図示例では事後内筒８とされた場合の軸方向に沿って、多数のスリット長穴状の穴１０が並んで形成されており、この穴１０は、完全な長穴状のものと、軸方向の端が開口した切欠長穴状のものとが、順次交互に形成されている。これと共に内筒形成部１４の軸方向の端には、内フランジ形成部１６が一体的に形成されており、図示例の内フランジ形成部１６は、上述の開口した切欠長穴状の穴１０および小切欠１７を介し、多数の小片状をなしている。

【００１７】次に、図１の（２）図，（３）図に示したように、このような金属板１３について、内筒形成部１４と外筒形成部１５を、内外に、図示例では若干の間隙Ａを存しつつ背中合わせに折曲すると共に、内筒形成部１４の各内フランジ形成部１６を、外筒形成部１５と反対側に直角に折曲する。しかる後、図２の（１）図，（２）図に示したように、このような金属板１３について、内筒形成部１４側を内側として円筒加工を実施することにより、内筒形成部１４により円筒状の内筒８が、外筒形成部１５により円筒状の外筒７が、内フランジ形成部１６により内フランジ１２が、それぞれ形成される。なお内フランジ１２は、図示例では内フランジ形成部１６にて形成されるので、多数の小片状のものの集合体よりなる。

【００１８】それから、図２の（３）図に示したように、前述により準備されていた担体コア２が挿入される。すなわち、上述した内筒８および外筒７をケースとし、その内部に、図示例では若干の間隙Ａを存しつつ担体コア２が同軸に収納される。しかる後、内筒８の排気ガス出口側１１の端部と、担体コア２の同排気ガス出口側１１の端部とが、例えばペースト状，粉末，フィラー状等のろう材を用いたろう接部１８により、接合される。これと共に担体コア２の同端部は、内筒８の端に形成された内フランジ１２にて、排気ガス出口側１１には抜き出し不能に係止される。又、図３の（１）図に示したように、前述により円筒加工された外筒７の両端が、突き合わせ溶接による溶接部１９にて接合され、外筒７が完全な円筒体とされるが、内筒８については、このような接合が適宜選択実施される。

【００１９】このようにして触媒担体６が製造される。この第１実施例の触媒担体６にあっては、内筒８と外筒７とが、図示例では若干の間隙Ａを存しつつ一体折曲形成され、又、内筒８には、多数のスリット長穴状の穴１０と内フランジ１２が形成され、かつ、内筒８と担体コア２とが端部で接合されている。そしてこのような外筒７内に、内筒８を介し図示例では更に若干の間隙Ａを存しつつ、担体コア２が収納されている。なお本発明は、このような第１実施例のものに限定されるものではなく、例えば次のようなものも考えられる。

【００２０】第１に、上述の第１実施例の触媒担体６において、担体コア２は断面真円状をなし、内筒８および外筒７も円筒状をなしていたが、例えば、前述により担体コア２が断面略楕円のトラックフィールド状をなす場合には、内筒８および外筒７もこれに見合った略楕円の筒状をなす。

【００２１】第２に、図３の（２）図は、本発明の第２実施例の平断面説明図である。すなわち、上述の第１実施例にあっては、内筒８と外筒７とが一体折曲形成されていたが、これによらず内筒８と外筒７とを別々に形成準備しておき、担体コア２が挿入されろう接部１８にて内筒８と接合された後に、このような内筒８と外筒７とを、排気ガス入口側の端部間の溶接部２０にて接合するようにしてもよい。又、内筒８と外筒７の方を先に溶接部２０にて接合した後に、担体コア２を内筒８に挿入してろう接部１８にて接合することも考えられる。この第２実施例の触媒担体６は、このような構成により、全体的な強度面により一層優れるという利点がある。

【００２２】第３に、図４は本発明の第３実施例および第４実施例を示し、（１）図は第３実施例の展開した状態の平面説明図、（２）図は第３実施例の同側面説明図であり、又、（３）図は第４実施例の展開した状態の平面説明図、（４）図は第４実施例の同側面説明図である。すなわち、上述した第１実施例において、内筒８に形成された穴１０は、軸方向に沿ったスリット長穴状をなしていたが、これによらず、例えば図４の（１）図，（２）図に示したように、パンチング加工等により多数の丸穴状の穴１０を形成するようにしてもよく、更に図４の（３）図，（４）図に示したように、軸方向と径方向に沿った小長穴状の穴１０、つまり縦横に交互に組み合わされた穴１０を形成するようにしてもよい。その他、内筒８に形成される穴１０の形状は、種々の形状のものが考えられる。

【００２３】第４に、図５は本発明の第５実施例を示し、（１）図は展開した状態の平面説明図、（２）図は同側面説明図、（３）図は折曲した状態の平面説明図、（４）図は同側面説明図である。すなわち、上述した第１実施例等にあっては、内筒８に穴加工が施され多数の穴１０が形成されていたが、内筒８にビード加工を施し、複数のビード２１を形成するようにしてもよい。す

なわち、図5に示したように上述した多数の穴１０と共に、又は多数の穴１０に代え、連続した小突起状のビード２１を形成するようにしてもよく、ビード２１は、図5に示した例では軸方向と直角の径方向に沿い２本形成されている。なお、これら第２，第３，第４，第５の各実施例において、その他の各構成部材の内容，機能等は、前述した第１実施例のものに準じるので、同符号を付しその説明は省略する。

【００２４】本発明は、以上説明したように構成されている。そこで以下のようになる。この排気ガス浄化装置用の触媒担体６は、ハニカム構造の担体コア２と、その収納用の外筒７と、両者間に介装された内筒８とからなっている。そして有害物質を含む排気ガスが担体コア２中を、排気ガス入口側から排気ガス出口側１１へと通過し、有害物質が、付着された触媒と反応して除去され清浄化される。このように触媒担体６は、高温の排気ガスが通過すると共に、触媒反応による発熱もみられる使用環境下で用いられ、触媒担体６の内部側の担体コア２と、外気にて冷却，放熱される外部側の外筒７とは、温度差が大きい。

【００２５】さてそこで、第１，第２，第３，第４，第５の各実施例の触媒担体６では、いずれも、このような担体コア２と外筒７間に内筒８が介装された２重構造よりなると共に、内筒８に多数の穴１０や複数のビード２１が形成されている。そこで担体コア２と外筒７とは、上述により温度差が大きく伸縮差が生じるが、まず内筒８が介装されることにより、両者は直接接しておらず一体的に接合されていないと共に、内筒８の多数の穴１０や複数のビード２１により、両者間に空間が形成されており、更に図示例では、内筒８と外筒７間および担体コア２と内筒８間にそれぞれ間隙Ａが存しているので、これらにより、担体コア２と外筒７間の温度差，伸縮差，熱応力等は確実に緩和される。

【００２６】すなわち、介装された内筒８の存在と、穴１０やビード２１による空気つまり空気層の存在と、空気層たる各間隙Ａの存在、更には穴１０やビード２１の変形等々により、まず、担体コア２と外筒７間の直接的な温度伝達が遮断されて温度差が緩和され、又、両者の径方向および軸方向の材料の伸縮差（膨張，収縮量の差）も対応吸収され、両者間の熱応力が緩和される。従ってこの触媒担体６は、長期間使用しても熱応力による伸縮が緩和され、熱応力疲労が回避されるので、担体コア２と外筒７間、特に担体コア２の外周側の２，３層目付近やろう接部１８，溶接部２０付近において、劣化，損傷，亀裂，破断等は確実に防止され、もって担体コア２の脱落も防止される。しかもこれらは、穴１０やビード２１付の内筒８を介装するだけで、簡単な構成により容易に実現される。

【００２７】又これに加え、この各実施例の触媒担体６では、内筒８の排気ガス出口側１１の端に内フランジ１２が形成され、担体コア２を係止しているので、担体コア２の内筒８や外筒７内からの脱落は確実に防止される。しかもこれは、内フランジ１２付の内筒８を介装するだけで、簡単な構成により容易に実現される。

【００２８】更に、これらの各実施例において、内筒８と担体コア２とは、排気ガス出口側１１の端部間のみが、ろう接部１８にて接合されている。そこで両者は、排気ガス入口側が自由端となっており、軸方向に何ら規制されることなく自由に伸縮可能であり、この面からも前述した伸縮差，熱応力等が緩和され、熱応力疲労が回避されて、劣化，損傷，亀裂，破断，脱落等は防止される。

【００２９】更に、第１，第３，第４，第５の各実施例の触媒担体６においては、内筒８と外筒７は、一体形成され内外に折曲されてなる。そこでこの触媒担体６は、特に簡単容易な構成よりなる。すなわち、内筒８と外筒７は一体折曲形成されるので、製造時における両者の面倒な接合作業は不用であり、作業が容易であると共に、両者の折曲加工も簡単であり、品質も安定する。

【００３０】

【発明の効果】まず、本発明の請求項１，２に係る排気ガス浄化装置用の触媒担体は、以上説明したように、担体コアと外筒と内筒とを有すると共に、内筒に多数の穴加工やビード加工を施したことにより、次の効果を発揮する。第１に、熱応力が緩和される。そこで、長期間使用しても熱応力疲労が回避され、担体コアと外筒間の劣化，損傷，亀裂，破断等は防止される。特に、従来熱応力疲労が顕著であった担体コアの外周側の２，３層目付近の亀裂，破断等が防止され、担体コアの脱落も防止される等、触媒担体の耐久性が向上する。第２に、しかもこれは簡単な構成により容易に実現され、作業性，コスト面，品質面等にも優れている。

【００３１】次に、請求項３に係る排気ガス浄化装置用の触媒担体は、以上説明したように、担体コアと外筒と内筒とを有すると共に、内筒に内フランジを形成したことにより、次の効果を発揮する。第１に、担体コアの外周側の２，３層目付近からの脱落が確実に防止されるほか、熱応力が緩和され熱応力疲労が回避されて、担体コアと外筒間の劣化，損傷，亀裂，破断等も防止される等、触媒担体の耐久性が向上する。第２に、しかもこれは簡単な構成により容易に実現され、作業性，コスト面，品質面等にも優れている。

【００３２】更に、請求項４に係る排気ガス浄化装置用の触媒担体は、担体コアと外筒と内筒とを有すると共に、内筒と外筒が一体折曲形成されたことにより、次の効果を発揮する。第１に、熱応力が緩和され熱応力疲労が回避されて、担体コアと外筒間の劣化，損傷，亀裂，破断等も防止され、担体コアの脱落が防止される等、触媒担体の耐久性が向上する。第２に、しかもこれは簡単な構成により容易に実現される。すなわち、製造時にお

いて面倒な内筒と外筒間の接合作業が不用である等、作業が容易で時間を要しないと共に、両者の折曲加工も簡単で加工費も削減される等、製造コストが低減され安価であり、品質も安定する。このように特に、作業性，コスト面，品質面等に優れている。このように、この種従来例に存した問題点が一掃される等、本発明の発揮する効果は、顕著にして大なるものがある。

【図面の簡単な説明】

【図１】本発明に係る排気ガス浄化装置用の触媒担体の第１実施例を示し、（１）図は、展開した状態の平面説明図、（２）図は折曲した状態の平面説明図、（３）図は、同側面説明図である。

【図２】同第１実施例を示し、（１）図は、円筒加工した状態の平面説明図、（２）図は、同要部の正面説明図、（３）図は、担体コアを入れた状態の平断面説明図である。

【図３】（１）図は、同第１実施例について担体コアを入れた状態の平面説明図であり、（２）図は、本発明の第２実施例の平断面説明図である。

【図４】本発明の第３実施例および第４実施例を示し、（１）図は、第３実施例の展開した状態の平面説明図、（２）図は、第３実施例の同側面説明図であり、（３）図は、第４実施例の展開した状態の平面説明図、（４）図は、第４実施例の同側面説明図である。

【図５】本発明の第５実施例を示し、（１）図は、展開した状態の平面説明図、（２）図は、同側面説明図、（３）図は、折曲した状態の平面説明図、（４）図は、

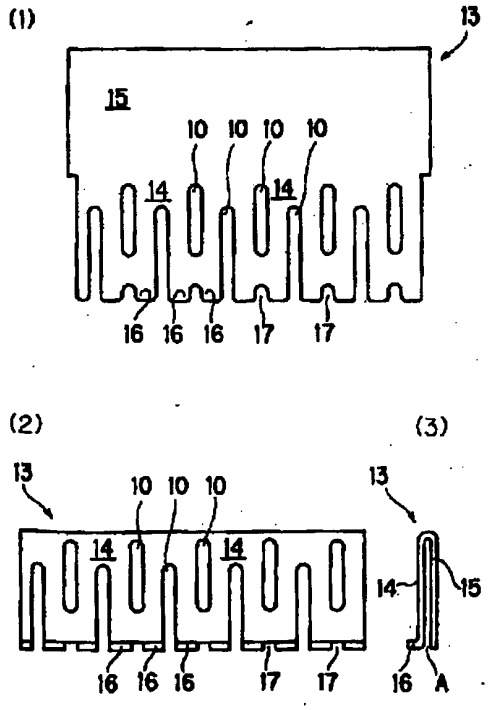
同側面説明図である。

【図６】従来例の排気ガス浄化装置用の触媒担体の説明に供する斜視図であり、（１）図は波板を、（２）図は平板を、（３）図は全体を示す。

【符号の説明】

１　触媒担体（従来例のもの）
２　担体コア
３　外筒（従来例におけるもの）
４　波板
５　平板
６　触媒担体（本発明のもの）
７　外筒（本発明におけるもの）
８　内筒
９　セル
１０　穴
１１　排気ガス出口側
１２　内フランジ
１３　金属板
１４　内筒形成部
１５　外筒形成部
１６　内フランジ形成部
１７　小切欠
１８　ろう接部
１９　溶接部
２０　溶接部
２１　ビード
Ａ　間隙

【図１】



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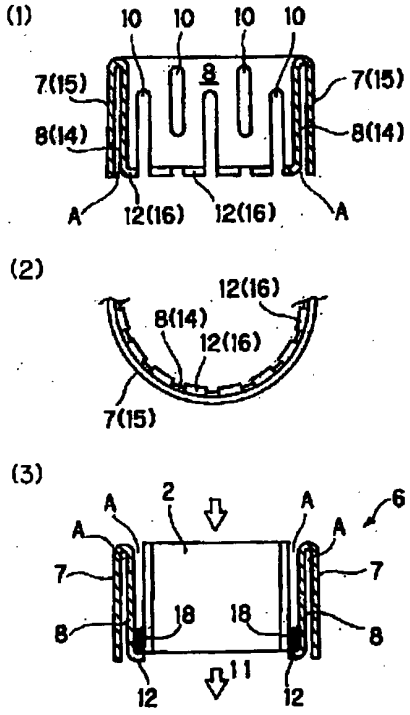
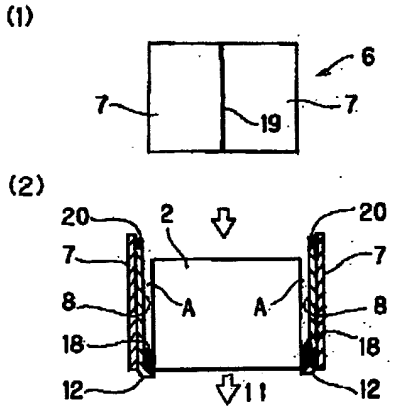


【図3】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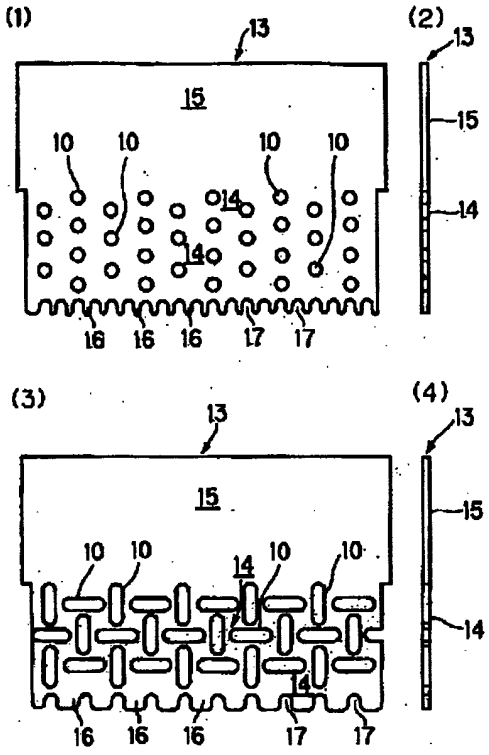
【図4】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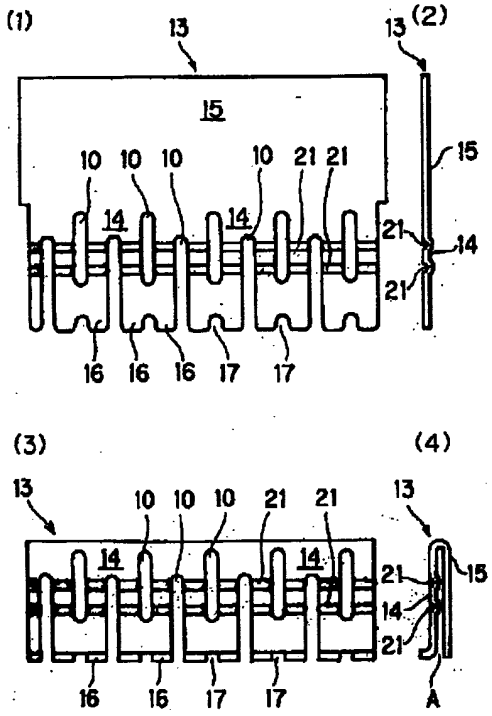
【図5】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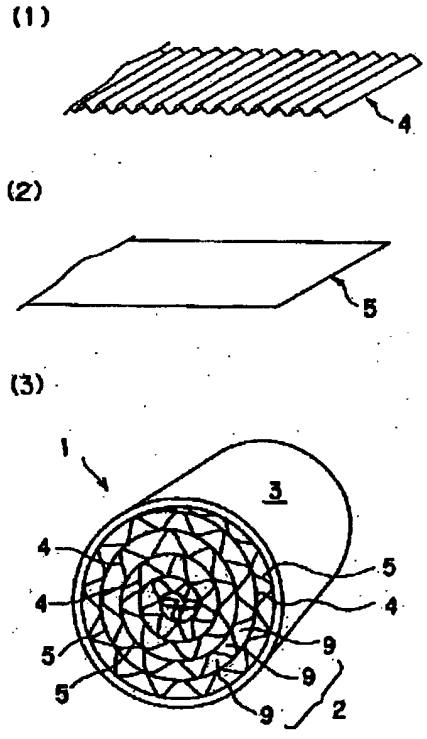
【図6】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